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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,014	12/04/2003	Purusottam Sahoo		7285

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Francis C. Hand, Esq.  
c/o Carella, Byrne, Bain, Gilfillan  
Cecchi, Stewart & Olstein  
5 Becker Farm Road  
Roseland, NJ 07068

EXAMINER

MCNEIL, JENNIFER C

ART UNIT	PAPER NUMBER
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1775

DATE MAILED: 12/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/728,014

Applicant(s)

SAHOO ET AL.

Examiner

Jennifer C McNeil

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-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 16 refers to polyester added to the MCrAlY powder. The polyester discussed in the instant specification is added to the top coat (zirconia). Is there what applicant intends to claim? For the purpose of examination, the claim is considered to intend that the polyester is added to the top coat.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 5, 8, 12, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Schilbe et al (US 6,132,520). Schilbe teaches a thermal barrier coating on a metal substrate. The coating includes a MCrAlY bond coat, where M may be nickel and/or cobalt. The bond coat may have a thickness of 1-10 mils, or 5-8 mils. The bond coat may be applied by spraying. An outer thermal insulating layer comprises a ceramic such as YSZ, and may have a thickness of 2-20 mils. The outer thermal insulating layer may also be applied via spray method. The thicknesses of Schilbe substantially overlap with the ranges of the instant claims.

Claims 1-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Nissley et al (US 6,102,656). Nissley teaches an abradable ceramic coating for a turbine engine component substrate. The substrate may comprise a metal superalloy. A bond coat of a MCrAlY material, wherein M is Ni, Co, Fe or mixtures thereof, is provided on the substrate and under the ceramic layer. The bond coat may have a thickness of 5-10 mils, preferably 6-7 mils. The bond coat may be applied via spray method. The abradable ceramic layer comprises YSZ, and has a thickness of 20-75 mil, preferably about 50 mils. The abradable ceramic layer is also deposited via a spray method.

Regarding claims 2, 3, 9, and 10, polyester may be added to the ceramic layer. The amount of polyester may be about 1 to about 7 wt%.

Regarding claims 4 and 11, Nissley teaches that 50 mils may be the thickness of the ceramic coating, which falls within applicant's claimed range.

Regarding claims 6 and 13, Nissley teaches that the MCrAlY coating may also contain silicon and hafnium.

Claims 15 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Farmer et al (US 6,663,919). Farmer teaches a turbine engine component having a metal substrate, a bond coating of MCrAlY thereon, and a YSZ layer deposited on the MCrAlY. The MCrAlY layer may be 0.006 inches thick and is deposited by spraying. The YSZ layer may be 0.020 inches thick and also deposited by spraying.

#### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4, 7, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schilbe et al (US 6,132,520). Schilbe teaches a thermal barrier coating on a metal substrate as discussed above. Schilbe teaches that the coating is for turbine blades, vanes and other components of a turbine engine. Schilbe does not specifically teach that the coating is on an inner shroud cover plate. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the thermal barrier coating of Schilbe to any surface of a turbine engine which is exposed to corrosive environments and would benefit from a protective coating. It is well known in the art of turbine engine components that protective coatings such as that taught by Schilbe prolong the life of the engine components.

Regarding claims 4 and 11, it would have been obvious to one of ordinary skill in the art at the time of the invention to apply the ceramic coating with a thickness sufficient to provide thermal insulation to the underlying substrate. While Schilbe teaches an upper limit of 20 mils, it would have been obvious to one of ordinary skill that a thicker layer can be applied to affect an increase in thermal insulation.

Claims 3, 7, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nissley et al (US 6,102,656). Nissley teaches an abradable ceramic coating as discussed above. Nissley teaches that polyester may be added to the ceramic layer to intentionally create porosity. The amount of polyester that may be added is about 1 to about 7 wt%. Nissley does not give specific examples of amounts of polyester added within this range. It would have been obvious to one of ordinary skill in the art at the time of the invention to add polyester in any amount within the range of 1-7 wt% as it is clearly taught as a workable range to obtain the desired porosity. One of ordinary skill in the art at the time the invention was made would have considered the invention to be obvious because the compositional

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proportions taught by Nissley overlap the instantly claimed proportions and therefore are considered to establish a prima facie case of obviousness. It would have been obvious to one of ordinary skill in the art to select any portion of the disclosed ranges including the instantly claimed ranges from the ranges disclosed in the prior art reference, particularly in view of the fact that;

“The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages”, In re Peterson 65 USPQ2d 1379 (CAFC 2003).

Also, In re Geisler 43 USPQ2d 1365 (Fed. Cir. 1997); In re Woodruff, 16 USPQ2d 1934 (CCPA 1976); In re Malagari, 182 USPQ 549, 553 (CCPA 1974) and MPEP 2144.05.

Regarding claim 7, Nissley teaches that the coating is for turbine blades, vanes and other components of a turbine engine. Nissley does not specifically teach that the coating is on an inner shroud cover plate. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the thermal barrier coating of Nissley to any surface of a turbine engine which is exposed to corrosive environments and would benefit from a protective coating. It is well known in the art of turbine engine components that protective coatings such as that taught by Nissley prolong the life of the engine components:

Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farmer et al (US 6,663,919) in view of Nissley et al (US 6,102,656). Farmer teaches a turbine engine component having a coating comprising an MCrAlY layer and a YSZ layer. Farmer does not teach the addition of polyester to the YSZ layer. Nissley teaches an abradable ceramic coating as discussed above. Nissley teaches that polyester may be added to the ceramic layer to intentionally create porosity. The amount of polyester that may be added is about 1 to about 7 wt%. Nissley does not give specific examples of amounts of polyester added within this range. Porosity of the zirconia or thermal barrier layers is known to impact the strain tolerance of the layer itself. It would have been obvious to one of ordinary skill in the art at the

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time of the invention to add polyester to the YSZ layer of Farmer, as it is taught by Nissley that an advantageous amount of polyester added to YSZ is in the range of 1-7 wt%. It would have been obvious to one of ordinary skill in the art at the time of the invention to add polyester in any amount within the range of 1-7 wt% as it is clearly taught as a workable range to obtain the desired porosity. One of ordinary skill in the art at the time the invention was made would have considered the invention to be obvious because the compositional proportions taught by Nissley overlap the instantly claimed proportions and therefore are considered to establish a prima facie case of obviousness.

### *Response to Arguments*

Applicant's arguments filed September 30, 2004 have been fully considered but they are not persuasive. Regarding claims 1-14, applicant argues that both Schilbe and Nissley do not teach the claimed subject matter because of intermediate layers. This is not persuasive because the claims are not limited to only those layers discussed. The claims use the term "comprising" and therefore are open to additional elements. Regarding the method limitations, the argument is not persuasive because there is no language in the claims that would limit the article to a thermal coating directly deposited onto the bond coat.

Applicant states that Schilbe is non-analogous art. This is not persuasive because Schilbe is clearly directed to a turbine engine component, similar to that claimed by applicant. Regardless of other teachings included in the patent, Schilbe discusses an article commensurate with that of the instant claims.

Regarding claim 4, applicant argues that one of skill would not have found it obvious that a thicker layer can be applied to increase in thermal insulation. Schilbe teaches an upper limit of 20 mils for the thermal insulating layer. 20 mils corresponds to 0.02 inches. Applicant's claimed range is 0.025 to 0.060 inches. It is not clear that an addition of 0.005 inches in thickness of the zirconia layer would affect the residual tensile stress of the coating. Applicant offers no thickness value at which the tensile

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stress increases, and only states that as the thickness increases, the tensile stress increases. One of ordinary skill would be able to provide a thickness with the desired thermal insulation while balancing the tensile stress. Applicant states that their structure is not a typical thermal barrier. The claims do not refer to any special features or methods of deposition that differ the coating from a typical coating. The claims are also not limited to a coating that is four times as thick as that of Schilbe.

Regarding new claims 14-18, the specification does not discuss the formation of an alumina layer on the bond coating. It is known in the art that MCrAlY coatings typically form an alumina layer by simple exposure, and not necessarily by a direct deposition. Is it applicant's intention that no alumina layer is formed on the bond coating? The Farmer reference teaches application of the zirconia layer directly to the bond coat.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer C McNeil whose telephone number is 571-272-1540. The examiner can normally be reached on 9AM-6PM.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on 571-272-1535. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jennifer McNeil  
December 26, 2004